



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : **Confirmation No. 3733**  
Hirokazu SO : Docket No. 2000\_1670A  
Serial No. 09/729,218 : Group Art Unit 3621  
Filed December 5, 2000 : Examiner C. Sherr

RECORDING MEDIUM, DATA RECORDING  
AND REPRODUCING DEVICE, AND  
SYSTEM FOR COLLECTING  
REPRODUCTION CONTROL INFORMATION

VERIFICATION

Assistant Commissioner for Patents,  
Washington, D.C.

Sir:

I, Shiro OGASAWARA, declare and say:  
that I am thoroughly conversant in both the Japanese and English languages; and  
that I am presently engaged as a translator in these languages;  
that the attached document represents a true English translation of the Japanese priority  
application no. 345776/1999.

I further declare that all statements made herein of my own knowledge are true and that all  
statements made on information and belief are believed to be true; and further that these statements  
were made with the knowledge that willful false statements and the like so made are punishable by  
fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that  
such willful false statements may jeopardize the validity of the application or any patent issuing  
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Signed this 5th day of February, 2003.

TRANSLATOR  
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the following application as filed with this Office.

Date of Application: December 6, 1999

Application Number: Japanese Patent Application Number 11-345776

Applicant(s): Matsushita Electric Industrial Co., Ltd.

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November 10, 2000

Commissioner,  
Patent Office

Kozo OIKAWA

Certificate Number 2000-3094183

[Document Name]	Patent Application
[Reference Number]	2032710018
[Date of Submission]	December 6, 1999
[Destination]	Commissioner of Patent Office
[International Patent Classification]	G11B 19/02
	G11B 27/00
[Inventor]	
	[Domicile or Residence] c/o Matsushita Electric Industrial Co., Ltd., of 1006, Oazakadoma, Kadoma-shi, Osaka-fu
	[Name] Hirokazu SO
[Patent Applicant]	
	[Identification Number] 000005821
	[Name] Matsushita Electric Industrial Co., Ltd.
[Representative]	
	[Identification Number] 100097445
	[Patent Attorney]
	[Name] Fumio IWAHASHI
[Appointed Representative]	
	[Identification Number] 100103355
	[Patent Attorney]
	[Name] Tomoyasu SAKAGUCHI
[Appointed Representative]	
	[Identification Number] 100109667
	[Patent Attorney]
	[Name] Hiroki NAITO
[Official Fee]	
	[Ledger Number] 011305
	[Amount Paid] 21000 Yen
[List of Attached Documents]	
	[Document Name] SPECIFICATION 1
	[Document Name] DRAWINGS 1
	[Document Name] ABSTRACT 1

[General Authorization Number]  
[Request for Proof]

9809938

No

[Document Name] SPECIFICATION

[Title of the Invention] RECORDING MEDIUM AND RECORDING AND  
REPRODUCING DEVICE

[Scope of Claim for Patent]

[Claim 1] A recording medium for recording digital data, wherein said digital data includes one or more content data and reproduction control information including a parameter for determining a reproduction frequency at time of random reproduction of said content data, and said reproduction control information is updatable.

[Claim 2] The recording medium according to claim 1, wherein the recording medium records the digital data, and said reproduction control information includes time and date information having said content data recorded therein.

[Claim 3] The recording medium according to claim 1, wherein the recording medium records the digital data, and said reproduction control information includes time and date information about when said content data is previously reproduced.

[Claim 4] The recording medium according to claim 1, wherein the recording medium records the digital data, and said reproduction control information includes reproduction number information about how many times said content data has been so far reproduced.

[Claim 5] A recording and reproducing device for

reproducing the recording medium of any one of claims 1 to 4, comprising: a reproduction frequency determination part for reading said reproduction control information from said recording medium, and generating reproduction frequency information indicating a reproduction frequency at time of random reproduction of said content data based on said reproduction control information;

a content data selection part for randomly selecting any content data to be reproduced so that the reproduction frequency indicated by the reproduction frequency information determined by said reproduction frequency determination part is achieved; and

a reproduction part for reproducing the content data selected by said content data selection part.

[Claim 6] The recording and reproducing device according to claim 5 for reproducing the recording medium of any one of claims 1 to 4, comprising a reproduction control information update part for updating said reproduction control information in said recording medium, and performing writing into said recording medium.

[Claim 7] The recording medium according to claim 5 for reproducing the recording medium of any one of claims 1 to 4, wherein said reproduction frequency determination part is provided with a timer, and determines the reproduction frequency by utilizing time information.

[Claim 8] The recording medium according to claim 5 for reproducing the recording medium of any one of claims 1 to 4, wherein said content data selection part comprises a random number generator, and a random number interrelation table which is a table used to determine which content data is to be reproduced from a random number obtained from said random number generator.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to a recording medium on which digital data is recorded, and a recording and reproducing device for reproducing the recorded digital data. Especially, related is a recording and reproducing device which randomly reproduces the digital data.

[0002]

[Prior Art]

A conventionally popular recording medium for storing digital data is an optical disk such as a laser disk (LD), compact disk (CD), mini disk (MD), and DVD. Recently, a smaller-sized semiconductor memory has started to take over such optical disk as is advantageously free from dropout.

[0003]

As to such recording medium, information recorded thereon is generally reproduced in a sequential manner. In the case that the data is music, especially, content data thereon, that is,

tracks, may be randomly changed in order when reproduced. Such reproduction method includes a random reproduction for selecting any recorded content data at random to reproduce.

[0004]

In the case that the recording and reproducing device randomly determines which content data is to be reproduced, commonly utilized are random numbers. The recording and reproducing device is provided with a random number generator, and random numbers generated by said random generator are referred to for determining which content data is to be reproduced, and the random reproduction is thus realized.

[0005]

At random reproduction, each content data is selected with equal frequency, most of the times, by a recording and reproducing device.

[0006]

As a reproduction method similar to the random reproduction, shuffle reproduction is included. Therein, a plurality of content data stored in a recording medium is randomly reproduced, and after reproduced on a one-time basis, the content data is stored on a reproducing device side, and thus is never reproduced again. This is a method of reproducing each content data for once, and is disclosed in Japanese Patent Laid-Open Publication No. 60-146989.

[0007]



Further, as to the random reproduction utilizing an optical disk, a method has been so far invented, and therewith, a flag specifying the number of reproduction times in said shuffle reproduction is assigned so as to unequalize the appearance frequency of the content data, and is disclosed in the Japanese Patent Laid-Open Publication No. 9-807509. With this method, by using a counter at time of shuffle reproduction, once the number of reproduction times of the content data exceeds a number specified by the flag, the content data is possibly not allowed to be reproduced.

[0008]

[Problems to be Solved by the Invention]

In such above conventional method, however, the appearance frequency of content data is fixed once determined at random reproduction, and thus is not changeable. For example, at random reproduction, there is no concern for increasing the reproduction frequency of content data which has been currently recorded or reproduced so far many times and users' preferences for content data are hardly reflected in the reproduction frequency.

[0009]

Therefore, in consideration of such above problems, an object of the present invention is to provide a recording medium and a recording and reproducing device capable of changing the reproduction frequency of content data at random reproduction of the content data.

[0010]

[Solution to the Problems]

A recording medium of the present invention includes several content data and reproduction control information including a parameter for determining a reproduction frequency at time of random reproduction of said content data. Said reproduction control information is characterized in being updatable.

[0011]

Therefore, by using said reproduction control information in the recording and reproducing device, it becomes possible to changeably determine the appearance frequency of said content data at random reproduction.

[0012]

Said reproduction control information includes, at least one or more, information indicating the reproduction frequency itself of said content data, or information which is a parameter for determining the reproduction frequency.

[0013]

Therefore, said reproduction control information may include time and date information indicating when said content data has been recorded.

[0014]

Said reproduction control information may include time and date information indicating when said content data has been

reproduced last time.

[0015]

Said reproduction control information may include information indicating how many times said content data has been so far reproduced.

[0016]

Further, a recording and reproducing device of the present invention includes: a reproduction frequency determination part for reading said reproduction control information from said recording medium, and determining a reproduction frequency at time of random reproduction; a content data selection part for randomly selecting any content data to be reproduced according to the reproduction frequency determined by said reproduction frequency determination part; and a reproduction part for reproducing the content data selected by said content data selection part.

[0017]

Said recording and reproducing device may include a reproduction control information update part for updating said reproduction control information in said recording medium, in consideration of the popularity of said content data.

[0018]

Said reproduction frequency determination part may be provided with a function of acquiring said reproduction frequency information from other media excluding said recording medium, and

determines the reproduction frequency by utilizing time information.

[0019]

Said reproduction frequency determination part may be provided with a timer, and determines the reproduction frequency by utilizing time information.

[0020]

Also, said recording and reproducing device may comprise, in said content data selection part, a random number generator, and a random number interrelation table which is used to determine which content data is to be reproduced from a random number obtained from said random number generator.

[0021]

Said random number interrelation table is the one used to interrelate the random number generated by said random number generator and the content data, and is created based on the reproduction frequency information provided by said reproduction frequency determination part at the beginning of the random reproduction.

[0022]

As described in the foregoing, the present invention is about a recording medium and a recording and reproducing device provided with a function to process reproduction control information which is information used to changeably determine the reproduction frequency at time of random reproduction.

[0023]

[Embodiment of the Invention]

Hereinafter, with reference to FIGS. 1 to 11, an embodiment of the present invention is described.

[0024]

FIG. 1 shows the data structure of a recording medium 100, which is a semiconductor memory. The recording medium 100 is structured by a content data storage region 10, a reproduction control information storage region 20, and an index information storage region 30. The content data storage region 10 includes at least one or more content data. In the example of FIG. 1, the content data storage region 10 includes N content data such as content data #1, content data #2, ..., content data #N. In this embodiment, the content data is presumed to be music data, and a format thereof is MP3 (MPEG1 Audio Layer3). Here, the format of music data may be LPCM, for example. Further, the content data is not limited to music data, and may surely be video data, text data, or a combination thereof.

[0025]

On the other hand, the reproduction control information storage region 20 includes at least one or more reproduction control information. Said respective reproduction control information has one-to-one relationship with said content data. Here, the content data #1, the content data #2, ..., and the content data #N correspond, respectively, to the reproduction control

information #1, the reproduction control information #2, ..., and the reproduction control information #N.

[0026]

Said reproduction control information includes content data identification information 21 which is information used to identify the corresponding content data, a reproduction frequency indirect factor 22 which is information used indirectly to determine a reproduction frequency at random reproduction, and a reproduction frequency direct factor 23 which is a value for use as it is as the reproduction frequency at random reproduction.

[0027]

Here, said reproduction control information does not necessarily include both of the reproduction frequency indirect factor 22 and the reproduction frequency direct factor 23.

[0028]

FIG. 2 shows the data structure of the reproduction frequency indirect factor 22.

[0029]

The reproduction frequency indirect factor 22 includes content data recording time and date information 22a, content data latest reproduction time and date information 22b, and content data reproduction count information 22c.

[0030]

The content data recording time and date information 22a indicates when said content data was recorded on the recording

medium 100.

[0031]

The content data latest reproduction time and date information 22b indicates when said content data was reproduced last time.

[0032]

The content data reproduction count information 22c indicates how many times said content data has been so far reproduced, in total, after recorded on the recording medium 100.

[0033]

Here, the reproduction frequency indirect factor 22 does not necessarily include the above three pieces of information, and may include at least one or more pieces of information relevant to the content data.

[0034]

FIG. 3 shows the data structure of the reproduction frequency direct factor 23.

[0035]

The reproduction frequency direct factor 23 stores a frequency value(s) itself in the reproduction frequency information indicating the pair of the content data and its reproduction frequency. The reproduction frequency direct factor 23 includes a frequency value 23a corresponding to the reproduction frequency information 1, a frequency value 23b corresponding to the reproduction frequency information 2, and

a frequency value 23c corresponding to the reproduction frequency information 3. In other words, the reproduction frequency direct factor 23 includes three frequency values corresponding to three types of reproduction frequency information, respectively, and accordingly random reproduction can be performed with three different reproduction frequencies.

[0036]

Here, the number of components included in the reproduction frequency direct factor 23 is not limited to three, and at least one frequency value may be sufficient corresponding to at least one type of reproduction frequency information.

[0037]

The index information storage region 30 is a region for storing information (e.g., recording address) required by the reproducing device when fetching the content stored in the content data storage region 10 and the reproduction control information stored in the reproduction control information storage region 20. In this embodiment, presumably, a SAT file system controls recording addresses, and the like, and information required by the FAT file system is stored in the index information storage region 30. Here, other type of file system such as UDF may be used, or no file system may be used to controlling the recording addresses.

[0038]

Described next is the recording and reproducing device of



the present invention.

[0039]

FIG. 4 shows the structure of the recording medium 100, which is a semiconductor memory, and the structure of a recording and reproducing device 200 being exemplarily implemented by a recording and reproducing audio player which records and reproduces digital data recorded on the recording medium 100.

[0040]

The recording and reproducing device 200 is provided with a reproduction frequency determination part 50 for reading the reproduction control information included in the reproduction control information storage region 20, and based thereon, determines a reproduction frequency for the content data stored in the content data storage region 10, a content data selection part 60 for randomly selecting, based on the reproduction control information determined by the reproduction frequency determination part 50, and a reproduction part 70 for reproducing thus selected content data.

[0041]

The reproduction frequency determination part 50 is provided with a reproduction control information acquisition unit 51, a reproduction frequency information generation unit 52, and a reproduction frequency information storage unit 53.

[0042]

The reproduction frequency determination part 50 may be

additionally provided with a timer 54.

[0043]

The content data selection part 60 includes a random number generator 61 and a random number interrelation table 62.

[0044]

The reproduction part 70 includes a decoder 71, a DA converter 72, and a speaker 73.

[0045]

The recording and reproducing device 200 may be additionally provided with a reproduction control information update part 80, which updates the reproduction control information included in the reproduction control information storage region 20 in consideration of the popularity of the content data.

[0046]

Described next below is the operation of each part structuring the recording and reproducing device 200.

[0047]

The reproduction frequency determination part 50 reads the reproduction control information in the reproduction control information storage region 20 on the recording medium 100. Determined based thereon is the reproduction frequency of each content data in the content data storage region 10. The reproduction frequency determination part 50 is provided with a reproduction control information acquisition unit 51, a

reproduction frequency information generation unit 52, and a reproduction frequency information storage unit 53.

[0048]

The reproduction control information acquisition unit 51 reads the reproduction control information recorded on the recording medium 100. Utilized for such reading is recording address information, for example, recorded in the index information storage region 30.

[0049]

By referring to such reproduction control information acquired in the reproduction control information acquisition unit 51, the reproduction frequency information generation unit 52 generates the reproduction frequency information, which includes the reproduction frequency corresponding to each content data. FIG. 8 shows an exemplary data structure of the reproduction frequency information. The reproduction frequency information includes content data identification information 21, and reproduction frequency values of content data at random reproduction.

[0050]

Here, described is how to generate the reproduction frequency information in the reproduction frequency information generation unit 52.

[0051]

Described first is a method how to utilize the reproduction

frequency indirect factor 22. FIG. 5 is a flowchart showing the procedure for determining the reproduction frequency of each content data included in the content data storage region 10 with the help of the reproduction frequency indirect factor 22.

[0052]

As for information used to generate the reproduction frequency information, described is the processing carried out along the procedure of FIG. 5 by referring to the content data recording time and date information 22a included in the reproduction frequency indirect factor 22.

[0053]

(S501) Check first whether the recording and reproducing device 200 is capable of selecting M content data to be reproduced at random reproduction out of N content data stored in the recording medium 100.

[0054]

(S502) If the selection function is determined as being included in step S501, M content data for reproduction is selected out of N content data stored in the recording medium 100. As for such selection of M content data, considered may be a method that the recording and reproducing device 200 determines based on a user's input, or a method for determining based on the information recorded on the recording medium 100.

[0055]

(S503) If the selection function is determined as not

included in S501, every N content data stored in the recording medium 100 is selected. That is, presumably,  $M = N$ .

[0056]

(S504) From the reproduction control information acquisition unit 51, the content data recording time and date information 22a of M content data for reproduction is received.

[0057]

Shown in FIG. 6 is thus received exemplary data.

[0058]

(S505) The content data recording time and date information 22a of M content data from #1 to #M is processed to make it easy to compare with one another. In this example, the number of days since a reference date is calculated, and is represented by  $T_1, T_2, \dots, T_M$ . Here, said reference date is assumed to be the earliest among M content data.

[0059]

FIG. 7 shows, on the basis of example of FIG. 6,  $T_1$  to  $T_5$  on the assumption that the reference date is May 1, 1999.

[0060]

(S506) Among those M data, the one maximum in value is regarded as  $T_{\max}$ , minimum as  $T_{\min}$ . Accordingly,  $T_{\max}$  corresponds to the-most-recently-recorded content data. In the example of FIG. 7,  $T_{\max} = 34$ , and  $T_{\min} = 0$ .

[0061]

(S507) The reproduction frequency for each content data

[0062]

[EQUATION 1]

$$\begin{matrix} \text{REPRODUCTION} \\ \text{FREQUENCY} \\ \text{VALUE} \end{matrix} = \left[ \begin{matrix} \text{MINIMUM} \\ \text{FREQUENCY} \\ \text{VALUE} \end{matrix} + \frac{T_i - T_{\min}}{T_{\max} - T_{\min}} \times \begin{matrix} \text{WEIGHTING} \\ \text{REFERENCE} \\ \text{VALUE} \end{matrix} \right]$$

[0063]

is calculated thereby. Here,  $1 \leq i \leq M$ .  $[x]$  denotes a maximum integer not exceeding  $x$ . Here, the weighting reference value is a parameter determining influence of the content data recording time and date information 22a on the reproduction frequency value, and is nonnegative in value. The larger this value, the more apparent the influence of the content data recording time and date information 22a on the reproduction frequency value becomes. The minimum frequency value is assigned equally to  $M$  content data to be reproduced, and is nonnegative in value. The minimum frequency value may be surely be 0.

[0064]

FIG. 8 shows the result obtained by substituting the minimum frequency value of 30 and the weighting reference value of 34 on the basis of the example of FIG. 7.

[0065]

Thus the reproduction frequency information is generated by the above steps.

[0066]

Here, the above equation (1) exemplarily applied in step S507 is not restrictive, and any equation will do as long as the

reproduction control information read by the reproduction control information acquisition unit 51 is a parameter for generating the reproduction frequency information.

[0067]

Alternatively, in the course of generating said reproduction frequency information, time information provided by the timer 54 and time information included in the reproduction control information may be both referred to. In such case, the reference date in step S505 may be a date at reproduction.

[0068]

As described in the foregoing, with the help of the content data recording time and date information 22a stored in the recording medium 100 to determine the reproduction frequency, the currently recorded content data can be increased in reproduction frequency. Accordingly, the user's can be automatically reflected in the reproduction frequency information.

[0069]

Alternatively, other than the content data recording time and date information 22a recorded on the recording medium 100, the content data latest reproduction time and date information 22b and the content data reproduction count information 22c may also be used to generate said reproduction frequency information.

[0070]

Described next is a method of utilizing the reproduction frequency direct factor 23. FIG. 10 is a flowchart showing the

procedure for determining the reproduction frequency of each content data in the content data storage region 10 with the help of the reproduction frequency direct factor 23.

[0071]

In the course of generating the reproduction frequency information, referred to is the frequency value 23a of the reproduction frequency information 1 included in the reproduction frequency direct factor 23, and followed is the procedure of FIG. 10, for example.

[0072]

(S1001) Check first whether the recording and reproducing device 200 is capable of, at random reproduction, selecting M content data for reproduction out of N content data stored in the recording medium 100.

[0073]

(S1002) As for such selection of M content data, considered may be a method that the recording and reproducing device 200 determines based on a user's input, or a method for determining based on the information recorded on the recording medium 100.

[0074]

(S1003) If the selection function is determined as not included in S1001, every N content data stored in the recording medium 100 is selected for reproduction. That is, presumably,  $M = N$ .

[0075]



(S1004) From the reproduction control information acquisition unit 51, the content data recording time and date information 23a of the reproduction frequency information 1 for M content data for reproduction is received, and is regarded as a reproduction frequency value at random reproduction.

[0076]

Thus the reproduction frequency information is generated with such steps. As such, the procedure is eased compared with the case that the reproduction frequency indirect factor 22 is used.

[0077]

Accordingly, for example, the reproduction control information update part 80 may so operate as to record, on the recording medium 100, the reproduction frequency calculated by utilizing the reproduction frequency indirect factor 23 as the reproduction frequency direct factor 23.

[0078]

Here, the frequency value 23a of the reproduction frequency information 1 is used in the above example, but frequency values of other reproduction frequency information may be used.

[0079]

Note here that, the information referred to in the course of generating the reproduction control information is not limited in one type, and the information in the reproduction frequency indirect factor 22 and the reproduction frequency direct factor

23 may be combined in a predetermined manner for use.

[0080]

The reproduction frequency information storage unit 53 stores the reproduction frequency information generated in the reproduction frequency information generation unit 52.

[0081]

The content data selection part 60 selects content data to be reproduced by referring to the reproduction frequency information determined by the reproduction frequency determination part 50. The content data selection part 60 includes the random number generator 61 and the random number interrelation table 62.

[0082]

FIG. 11 is a flowchart showing an exemplary procedure for selecting content data to be reproduced. Description is now made according to the procedure example.

[0083]

(S1101) The content data selection part 60 fetches the reproduction frequency information stored in the reproduction frequency information storage unit 53.

[0084]

(S1102) The reproduction frequency information fetched in S1101 is utilized to generate the random number interrelation table 62. At this time, there needs to concern a characteristic of the random number generator 61 to create the random number

interrelation table (which value is generated in which probability). In this example, the random generator 61 is presumed to generate nonnegative integers (0 to RANDMAX) with the same probability, and RANDMAX should be large enough.

[0085]

FIG. 9 shows an exemplary random number table 62 created on the basis of the reproduction frequency information in FIG. 8. In this example, each content data is assigned random numbers, in ascending order from 0, in such a manner that the number of rows in the table for the random numbers is equalized to that for the reproduction frequency value. In the table of FIG. 9, 208 values of 0 to 207 are assigned to the content data.

[0086]

(S1103) Any random number being a positive integer is fetched from the random number generator 61.

[0087]

(S1104) The random number interrelation table 62 is referred to for comparison with the random number fetched in S1103, and then content data for reproduction is selected. In the case of using the random number interrelation table 62 of FIG. 9, the fetched random number is not always in the range of 0 to 207. Therefore, the random number fetched in step S1103 is once divided by 208, and thus calculated remainder is used. By referring to FIG. 9, when the remainder is 59, the content data #2 is selected, and when the remainder is 203, selected is the content data #5.

[0088]

With such above steps, the content data for reproduction is selected.

[0089]

The reproduction part 70 reproduces the content data selected by the content data selection part 60. The selected content data (here, MP3 music data) becomes audible from the speaker 73 after decoded by the decoder 71, and then D/A conversion carried out by the DA converter 72.

[0090]

The reproduction control information update part 80 updates the reproduction control information included in the reproduction control information storage region 20 depending on the popularity of the content data. The reproduction control information recorded on the recording medium 100 is acquired by the reproduction control information acquisition unit 51, and is then updated based on the reproduction state (for example, which content data has been reproduced how many times and when) provided by the content data selection part 60, and the like, so that the updated reproduction control information is written into the recording medium 100.

[0091]

Note that, the above embodiment is no more than a system example which is expected to achieve optimal results under the present circumstances. Therefore, numerous other modifications

and variations can be devised without departing from the scope of the invention. For example, the following changes and execution are possible.

[0092]

In the present embodiment, the recording medium 100 is presumed to be a semiconductor memory, but the semiconductor memory is not restrictive, and any recording medium will do as long as updatable the reproduction control information such as rewritable DVD-RAM, for example. Further, the data recording and reproducing device 200 is presumed to be a recording and reproducing audio player, but this is not restrictive, and any recording and reproducing device will do as long as digital data can be recorded and reproduced therein.

[0093]

[Effect of the Invention]

As described in the foregoing, according to the present invention, the reproduction frequency of each content data at random reproduction can be changeably generated, and thus random reproduction matching to the user's preferences is advantageously and effectively expected.

[Brief Description of the Drawings]

[FIG. 1]

A diagram showing an example of the data structure of a recording medium of the present invention.

[FIG. 2]

A diagram showing an example of the data structure of a reproduction frequency indirect factor of the present invention.

[FIG. 3]

A diagram showing an example of the data structure of a reproduction frequency direct factor of the present invention.

[FIG. 4]

A block diagram showing the structure of the recording medium and a recording and reproduction device of the present invention.

[FIG. 5]

A flowchart showing the procedure for generating reproduction frequency information to which the reproduction frequency indirect factor of the present invention is applied.

[FIG. 6]

A diagram showing a specific example of the procedure, step S504, for generating the reproduction frequency information of the present invention.

[FIG. 7]

A diagram showing a specific example of the procedure, step S505, for generating the reproduction frequency information of the present invention.

[FIG. 8]

A diagram showing a specific example of the procedure, step S507, for generating the reproduction frequency information of the present invention.

[FIG. 9]

A diagram showing examples of the data structure and data of a random number interrelation table of the present invention.

[FIG. 10]

A flowchart showing the procedure for generating reproduction frequency information to which the reproduction frequency direct factor of the present invention is applied.

[FIG. 11]

A flowchart showing the exemplary procedure for selecting content data of the present invention.

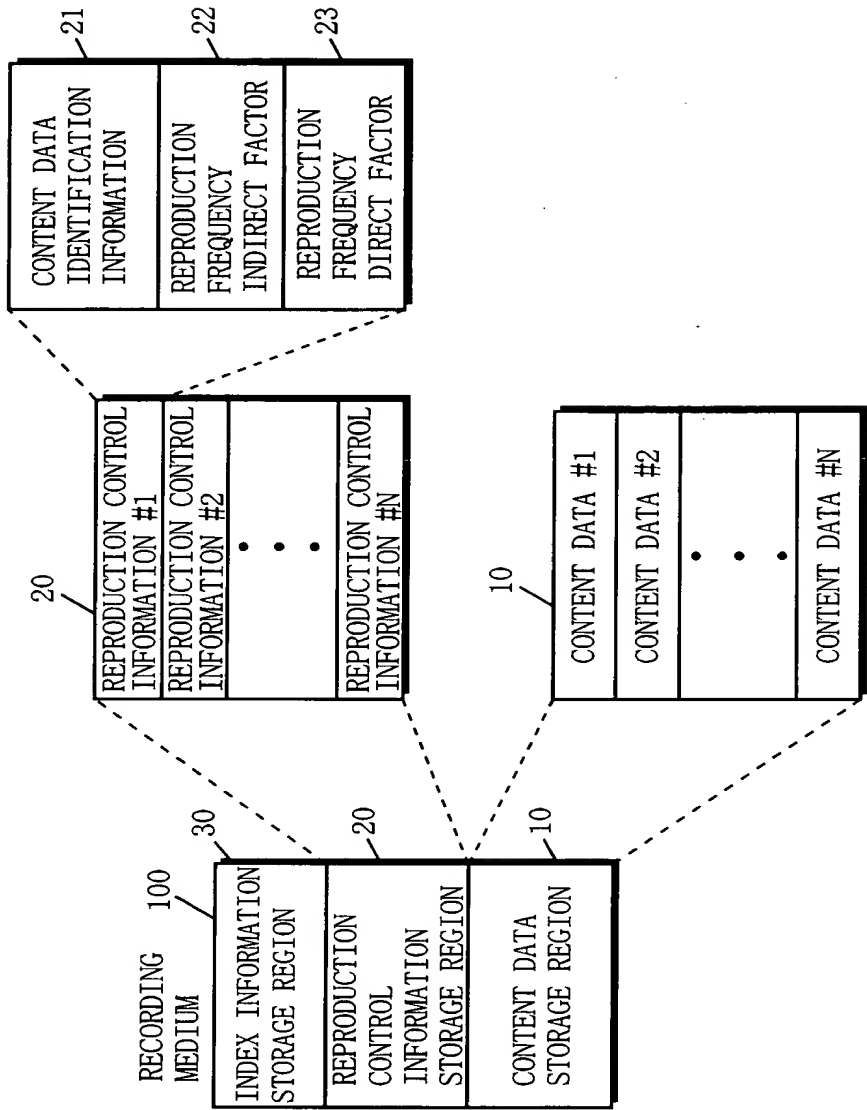
[Description of the Reference Characters]

- 10 content data storage region
- 20 reproduction control information storage region
- 21 content data identification information
- 22 reproduction frequency indirect factor
- 22a content data recording time and date information
- 22b content data latest reproduction time and date information
- 22c content data reproduction count information
- 23a frequency value of reproduction frequency information 1
- 23b frequency value of reproduction frequency information 2
- 23c frequency value of reproduction frequency information 3

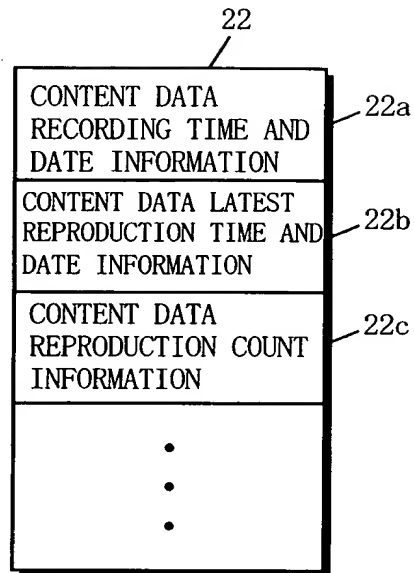
30 index information storage region  
50 reproduction frequency determination part  
51 reproduction control information acquisition unit  
52 reproduction control information generation unit  
53 reproduction frequency information storage unit  
54 timer  
60 content data selection part  
61 random number generator  
62 random number interrelation table  
70 reproduction part  
71 decoder  
72 DA converter  
73 Speaker  
80 reproduction control information update part  
100 recording medium  
200 recording and reproducing device



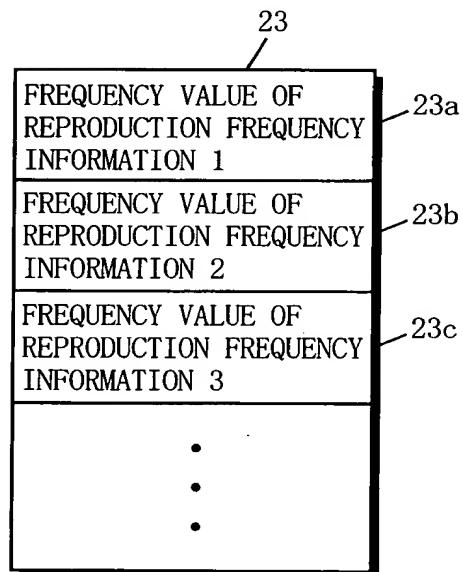
[ F I G . 1 ]



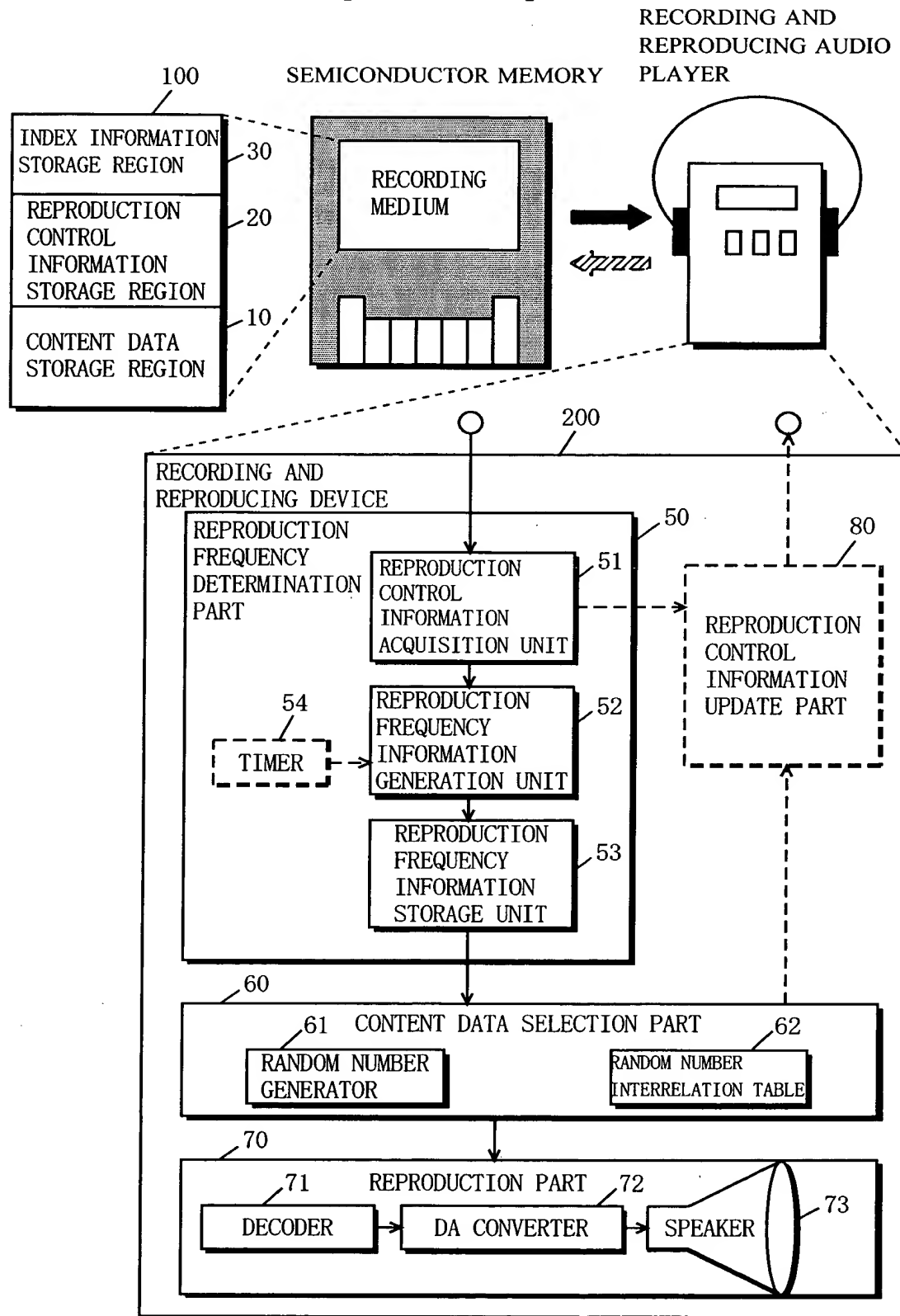
[ F I G . 2 ]



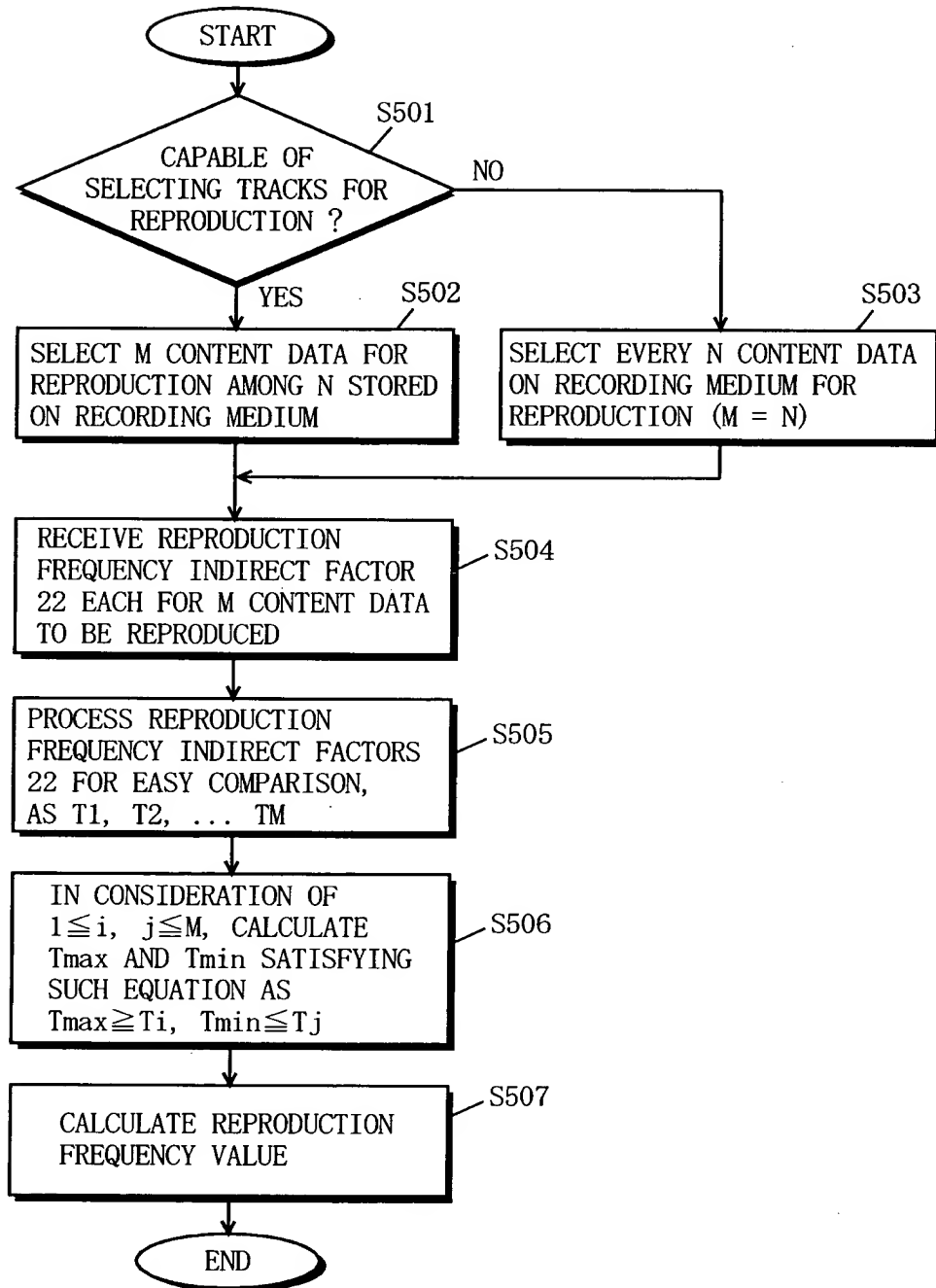
[ F I G . 3 ]



[ F I G . 4 ]



[ F I G . 5 ]



[ F I G . 6 ]

CONTENT DATA IDENTIFICATION INFORMATION 21	CONTENT DATA RECORDING TIME AND DATE INFORMATION 22a
#1	1999/05/07
#2	1999/05/01
#3	1999/05/15
#4	1999/05/05
#5	1999/06/04

[ F I G . 7 ]

CONTENT DATA IDENTIFICATION INFORMATION 21	DAYS SINCE REFERENCE DAY 1999/05/01
#1	T1 = 6
#2	T2 = 0
#3	T3 = 14
#4	T4 = 4
#5	T5 = 34

[ F I G . 8 ]

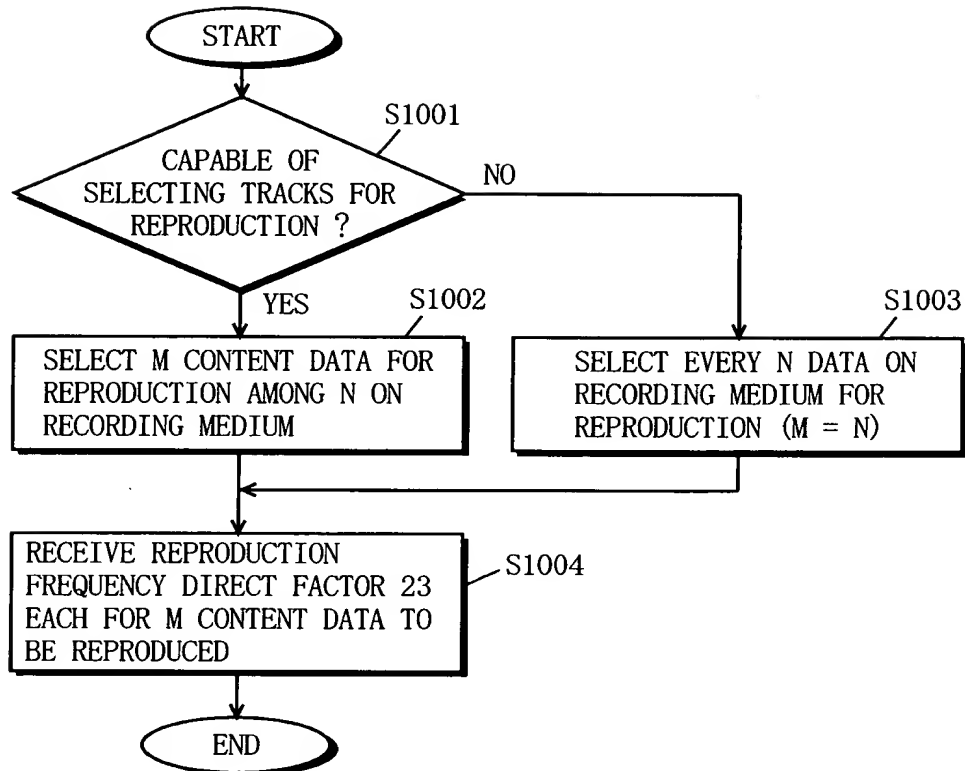
CONTENT DATA IDENTIFICATION INFORMATION 21	REPRODUCTION FREQUENCY VALUE
#1	36
#2	30
#3	44
#4	34
#5	64

[ F I G . 9 ]

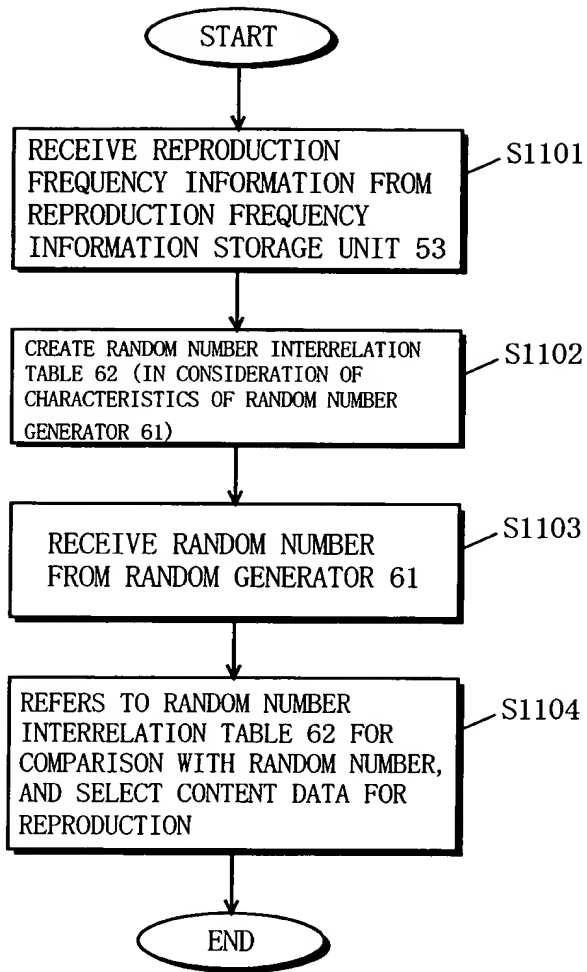
RANDOM NUMBER INTERRELATION TABLE 62

CONTENT DATA IDENTIFICATION INFORMATION 21	RANDOM NUMBER
#1	0 ~ 35
#2	36 ~ 65
#3	66 ~ 109
#4	110 ~ 143
#5	144 ~ 207

[ F I G . 1 0 ]



[FIG. 11]





[Document Name]     ABSTRACT

[Summary]

[Object]    To provide a recording medium and a recording and reproducing device capable of changeably determining a reproduction frequency when randomly reproducing digital data recorded on the recording medium.

[Solution] A recording medium 100 having recorded digital data includes a content data storage region 10, a reproduction control information storage region 20 having a parameter for determining a reproduction frequency at random reproduction, and an index information storage region 30.    The reproduction control information included in the reproduction control storage region 20 is updatable, and thus the reproduction control information helps the reproduction frequency to change at reproduction if utilized for determining the reproduction frequency in a data recording and reproducing device.

[Selected Figure]            FIG. 1

APPLICANT'S HISTORY INFORMATION

Identification Number [000005821]

1. Date of Change August 28, 1990

[Reason for Change] New Registration

Address: 1006, Oazakadoma, Kadoma-shi, Osaka-fu

Name: Matsushita Electric Industrial Co., Ltd.